



# ***Technology News***

**October 2002**

◇ **USDA Natural Resources Conservation Service** ◇ **Science and Technology** ◇

"NRCS *Technology News*" is an electronic information piece provided by Science and Technology 10 times a year. It is designed to deliver pertinent information to our customers about new technology, products, and services available from the Soil Survey and Resource Assessment and the Science and Technology deputy areas. "NRCS *Technology News*" is in a format that is available to all NRCS field staff.

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## ● MESSAGE FROM THE DEPUTY CHIEFS

### **Lawrence E. Clark and Maurice J. Mausbach**

Land-based non-point source (NPS) pollution, including sediments and nutrients, has been identified as one of the greatest causes of adverse impacts to coral reef ecosystems. Much of this pollution is from urbanization, coastal development, agriculture, mining and deforestation. To address the agricultural component of NPS pollution, USDA was included in Executive Order (EO) 13089 – Coral Reef Protection, as a formal member of the U.S. Coral Reef Task Force (CRTF). Eleven other Federal agencies and the Attorney General are also formal members of the Task Force. The Natural Resources Conservation Service's Ecological Sciences Division provides technical assistance for implementing the EO to the USDA Deputy Under Secretary for Natural Resources and Environment.

Coral reefs are spectacular, diverse and complex ecosystems that develop in shallow tropical waters. They are massive structures built largely by colonial invertebrate animals that secrete skeletons of calcium carbonate. The skeleton remains after the animals die, forming a foundation for the next generation. These calcium carbonate foundations, sometimes hundreds of meters in thickness, can survive for millions of years. However, the living and growing part of the reef that sits atop this massive structure is quite fragile and can be easily damaged by natural or human disturbance. There are both environmental and economic consequences to degrading or dying coral reef ecosystems because healthy reef ecosystems provide so many valuable services.

Coral reefs protect shorelines from erosion and loss of land mass caused by damaging waves and provide habitat for commercially valuable fish species. Reefs provide the protection needed for other coastal ecosystems to develop, such as mangroves and sea-grasses which support a high level of species diversity in their own right. Corals also provide opportunities for the development of new medicines to fight cancer and other diseases.

In addition, coral reefs provide significant recreational and aesthetic benefits. Although coral reefs comprise less than 0.2 percent of the total ocean, they are found off the coasts of more than 100 countries and are integral components of many of the local economies because of the tourism and fishing opportunities they provide. In the Florida Keys alone, visitors spend over \$1 *billion* a year where reefs are the primary attraction. Court approved recoveries for damaged reef areas, based only on the cost of restoration and lost tourism during recovery, have reached as much as \$2,833 per square meter of reef surface. This estimate places the value of most coral reef ecosystems in the billions of dollars without adding any additional value for all the other services coral reefs provide.

Human activities in coastal areas adjacent to reefs or in watersheds hundreds of miles away can potentially harm coral reef ecosystems. Sediments and nutrients which runoff the land are transported by rivers and streams into open oceans. Here they can be carried by currents into and around coral reef ecosystems. These pollutants degrade water quality, which directly or indirectly impacts coral reef health.

For example, watershed-borne sediment can deposit directly onto coral reefs, smothering reef organisms. Turbid water caused by suspended sediments can reduce or eliminate sunlight from reaching the symbiotic algae—the coral polyps' life support system—causing stress or death. Furthermore, many fish and invertebrates leave the reef area to feed or spawn, but water pollution can damage the feeding and spawning areas reducing the size and quality of these habitats. Because of the many symbiotic relationships that exist between invertebrates and fish and the living reef, adverse impacts to spawning and feeding habitats associated with the reef can have major implications for the survival of the coral reef ecosystem. To date, it is estimated that 10 percent of the world's coral reefs have been destroyed as a result of human activities. Thirty percent more reef ecosystems are considered significantly degraded or threatened and the downward trend continues.

NRCS personnel in the Pacific Basin, Hawaii, the Caribbean Area, and Florida have been implementing conservation practices, providing educational activities, and other actions that benefit coral reef ecosystems. Examples of conservation practices include: animal waste management systems, field borders, grassed waterways, nutrient and pesticide management, conservation buffers, and conservation cropping systems. In FY 2001, these conservation activities prevented over 400,000 tons of sediment and associated nutrients and pesticides, which had the potential to enter receiving waters impacting coral reef ecosystems, from leaving the fields.

For more information on USDA activities benefiting coral reef ecosystems go to:  
[http://www.nrcs.usda.gov/programs/coral\\_reef/coral\\_reef.html](http://www.nrcs.usda.gov/programs/coral_reef/coral_reef.html) or  
<http://www.nrcs.usda.gov/technical/ECS/aquatic/aqualinks.html>.

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## **● CONSERVATIONIST'S CORNER**

### **Rosendo Trevino, State Conservationist, New Mexico**

Against a backdrop of critical natural resource issues, the NRCS national institutes and centers are playing vital roles in New Mexico. Natural resource issues headlined the news during summer 2002 in New Mexico. Wildfires, drought, depletion of grazing lands, and water demands captured the public's attention on a daily basis. According to recent polls water issues now rank first among citizen concerns - outpacing crime as the number one issue for the first time in nearly 20 years. Public awareness of how the threat

of floods follows wildfires is evident in the press, and new buzzwords the public is being asked to understand include “hydrophobic soils” and “defensible space.”

The harbinger of natural resource issues for New Mexico this summer was the early warning in January of water runoff shortfalls. Snow surveys were being completed by NRCS staff and, in collaboration with the National Water and Climate Center, runoff forecasts were prepared. These forecasts warned farmers and ranchers, cities and towns, and wildlife preservationists of the runoff problems to come. Such predictions prepared agriculturists, city leaders, and Federal agencies in Albuquerque, which then reached an unprecedented agreement to loan and lease water so that all interests could be served.

Another use of the national centers, which addresses the water issue so critical in the state, is on the Cottonwood-Walnut Dam Site #19 project near Artesia, New Mexico. The National Design, Construction, and Soil Mechanics Center is assisting NRCS New Mexico staff by providing the project’s soil mechanics design. This dam will provide irrigation water, offer flood control, and enhance recreation opportunities.

NRCS New Mexico was reminded this summer that the role of the national institutes and centers is vital in rehabilitation of lands scorched by wildfire. Rehabilitation practices depend on the type of soils present. Efforts must concentrate on the fragile soils to be most effective. The work of the Soil Quality Institute (SQI) and National Soil Survey Center (NSSC) provides a bridge between the research conducted in this nation's universities and staffs like ours in New Mexico. They alert us to the latest technology that we can use for burned-over areas or in our daily routine work. The SQI and NSSC have helped us understand the relationships between soil and biological crust, which is a big issue in the Western United States.

Finally, the National Cartography and Geospatial Center is basic in providing us with the tools we need to do conservation planning. They provide us with the data - the maps crucial to our work. The conservation planning done with these tools has been particularly critical in this summer's drought. It is through conservation planning that our farmers and ranchers can survive droughts and capitalize on water during wet years.

New Mexico has faced many major natural resources issues this past summer. The national institutes and centers have contributed to the right answer at the right time for these challenges. They have contributed to our staff identifying the right solution for fragile soils in burned over areas, conservation planning in the face of drought, and broadcasting of early alerts to snow runoff shortages. We applaud the manner in which our staff has risen to these challenges, and the role played by the national institutes and centers.

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## ● TECHNOLOGY TRANSFER

### **#1 Network Diagram Method Evaluated for Cumulative Effects Analysis**

The Watershed Science Institute (WSSI), in cooperation with NRCS Oregon and NRCS National Headquarters, has been investigating and documenting a variety of methodologies to help planners think through the beneficial and potentially adverse cumulative effects of existing and planned actions. One of these methods, network diagramming, was found to be particularly effective because it presents a logical, visual “map” that can be used to display direct, indirect, and cumulative effects of conservation activities. Network diagrams are also especially useful in representing the complex relationships within ecological systems and their responses to certain disturbances. An example of a diagram is given in the ForestryPracticesEffects-3Sep02-Draft.ppt file in the ftp folder at <ftp://ftp.wcc.nrcs.usda.gov/watershed/networkdiagrams/>.

As a direct result of WSSI’s work with the NRCS Oregon staff in the Tillamook Watershed Plan, the Agency has increased its technical understanding of cumulative effects analysis (CEA) documentation methodologies. This became the basis for the WSSI staff to lead, with other Agency specialists, the diagramming of the effects of approximately 60 conservation practices, for use in the 2002 Farm Bill Environmental Assessments. The WSSI is also exploring the use of network diagramming as a modeling framework to document the scientific basis for and the quantifiable effects of a number of conservation practices in a Northeastern watershed dominated by dairy farming.

This effort demonstrates how technological advances can be incubated by a single project and ultimately prove valuable to others through effective and timely transfer.

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### **#2 New SCAN Station Installed at Hubbard Brook Experimental Forest**

A new SCAN (Soil Climate Analysis Network) station was installed recently at the U. S. Forest Service Hubbard Brook Experimental Forest. The station was paid for by the Forest Service to help meet its growing need for soil-climate information. This new station is equipped with all of the standard atmospheric, soil moisture, and soil temperature measuring devices that are normally associated with a SCAN site, with an

important addition – a snow pillow to measure snow water content and snow depth. The Forest Service is glad to get snowpack information to enhance its wetland and hydrology studies. The Hubbard Brook Forest, which is a long-term ecological research unit, continues to provide leading edge research in forest ecology, wetland studies, and hydrologic investigations.

This station brings the SCAN network to 71 stations in 39 states. All of the data can be viewed on the Web at: <http://www.wcc.nrcs.usda.gov>.

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## **#3 NRCS Joins the Cooperative Ecosystem Studies Units**

In August 2002, the NRCS joined two Cooperative Ecosystem Studies Units: the Great Lakes-Northern Forest CESU (sponsored by the Soil Survey Division) and the Gulf Coast CESU (sponsored by the Wildlife Habitat Management Institute). An agreement to join a third CESU, the Great Basin, which is sponsored by the State Conservationist in Nevada, is under review and is expected to be signed soon.

CESUs are collaborations among Federal agencies and universities, are based at universities, and are focused on a biogeographic region of the country. Universities provide space, basic administrative support, and access to university faculty, students, staff, and resources, while Federal agencies contribute research scientists and/or other professionals. CESUs provide opportunities for interdisciplinary and multi-agency research, technical assistance, and education. They function as "virtual" organizations, linking several institutions to increase access to expertise and facilities.

The objectives of Cooperative Ecosystem Studies Units are to: (1) provide resource managers with high-quality scientific research, technical assistance, and education; (2) deliver research and technical assistance that is timely, relevant to resource managers, and needed to develop and implement sound adaptive management approaches; (3) ensure the independence and objectivity of research; (4) create and maintain effective partnerships among Federal agencies and universities to share resources and expertise; (5) take full advantage of university resources while benefiting faculty and students; (6) encourage professional development of Federal scientists; and (7) manage Federal science resources efficiently.

A Memorandum of Understanding to become a partner in the Cooperative Ecosystem Studies Units Network was signed in February 2002. The NRCS is now a full member of

the CESU Coordinating Council. For information and maps, visit the CESU Website at: <http://www.cesu.org/cesu/>

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## **#4 Standard Data Format Facilitates Use of Soil Survey Data**

Soil survey data exported from the National Soil Information System (NASIS) in the new SSURGO Version 2 format is the standard data delivery format for users of soil survey data. Since its introduction more than a year ago, the new data format has been integrated into the Customer Service Toolkit and Soil Data Viewer. RUSLE2 (Revised Universal Soil Loss Equation) and the Windows© Pesticide Screening Tool use it. Data exported from NASIS can be imported into Microsoft Access© using a database template available on the NASIS Web site <http://nasis.nrcs.usda.gov/>, and a full set of documentation for the SSURGO Version 2 format is available at [http://nasis.nrcs.usda.gov/documents/metadata/ssurgo2\\_0](http://nasis.nrcs.usda.gov/documents/metadata/ssurgo2_0).

All of this is good news for users of soil survey data. For example, application specialists at the Farm Services Agency (FSA) are working closely with scientists at the National Soil Survey Center to acquire soil survey data needed for the next Conservation Reserve Program (CRP) signup. Although much of their discussion is focused on the scientifically sound application of soil survey data, simply acquiring the appropriate data is an important consideration as well. Acquiring the data is no small task, given FSA's requirements – automate the ranking process as much as possible and use contemporary soil survey data that is consistent with the NRCS Field Office Technical Guide. The task is greatly facilitated by making soil survey data available in the same standard format used by Customer Service Toolkit.

The next step in development of this process is for the models using soils data in the SSURGO Version 2 format to access the data directly as opposed to creating a subset with the model. Soil scientists have been working with model developers to help achieve this next important step. Once it is achieved, users of models can be assured the soils data they are using is of the same vintage in all models they run.

**For more information, contact:**

Russ Kelsea



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## ● WEB-BASED TECHNOLOGY

### #5 HortNote Newsletter Provides Woody Plant Information

HortNote is a new practical electronic newsletter from the Plant Materials Program about tree and shrub horticulture. Developed and produced by the Plant Materials Center in Bridger, Montana, HortNote provides timely information on various woody plant and conservation horticulture topics. The third issue, recently distributed, explains the use of microinjection as a tool for controlling woody plant pests and diseases. Two earlier HortNotes are filled with helpful tips for maximizing survival, health, and performance of bareroot seedlings and watering techniques for plant establishment. Future issues of HortNote will address such topics as windbreak design, installation, protection and maintenance; species selection; greenhouse operations; plant propagation and production; and native, low maintenance, and xeriscape landscaping.

Three HortNotes are available on the Plant Materials Program Web site. Visit <http://plant-materials.nrcs.usda.gov/pubs/mtpmcarhortnote1.pdf> for HortNote No. 1, <http://plant-materials.nrcs.usda.gov/pubs/mtpmcarhortnote2.pdf> for HortNote No. 2, and <http://plant-materials.nrcs.usda.gov/pubs/mtpmcarhortnote3.pdf> for HortNote No. 3.

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### #6 New SOILS Web Site Online

The new SOILS Web site, <http://soils.usda.gov>, has been developed by combining the popular National Soil Survey Center and Soil Survey Division Web sites. The reorganized site has a new look and offers many new features and functions, such as improved navigation and loading speed. The SOILS site not only provides user access to soil information, but also offers soil science educational material, standards for the National Cooperative Soil Survey, and a lot more.



Beginning October 1, 2002, all URLs previously linked to the site hosted by Iowa State University are forwarded to the home page of the new site. Users will need to establish a bookmark for the new site, hosted at the Fort Collins NRCS Webfarm.

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## **#7 Wildfire Plant Science Featured on Plant Materials Web Site**

From investigating burned-site rehabilitation strategies to evaluating species for fire-resistant plantings at the wildland-urban interface, the Plant Materials Program has played a key role in advancing wildfire-related plant science. Now NRCS staff and others can access Plant Materials wildfire information in a special feature on the Program's Web site, <http://Plant-Materials.nrcs.usda.gov/>. Users can download publications by Plant Materials Centers and Plant Materials Specialists on wildfire recovery, seeding, and landscaping with fire-resistant plants. The wildfire feature also has a list of plant species suitable for revegetation, with links to plant guides and plant fact sheets detailing their use, establishment, and management. For users seeking additional information, the site references related Web sites, including NRCS California Emergency Watershed Protection Fact Sheets, National Interagency Fire Center, and United States Fire Administration Fire Resources.

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## **● TRAINING**

## **#8 "The Leader in You" Fall Series Scheduled**

The Fall 2002 series of "The Leader in You" training seminars is scheduled for Thursday, November 14, from 1:00 to 3:00 p.m. e.s.t. and Tuesday, December 10, from 11:00 a.m. to 12:30 p.m. e.s.t. Leadership and change are the important concepts explored by both satellite broadcasts.

"Leaders Teaching Leaders: Accelerating the Pipeline," broadcast on November 14, will emphasize the all-important message that "LEADERS develop leaders." Trainer Andrea Zintz, vice-president of Human Resources and a member of the Management Board at Johnson and Johnson, will encourage leaders to share their knowledge and experience to accelerate the progress of new leaders through the development pipeline.

"Leading Change," broadcast on December 10, will be presented by John Kotter from the Harvard Business School, who is widely regarded as the world's chief authority on leadership and change. His presentation will give special attention to the necessity and importance for leadership and management to facilitate change. Participants will learn to identify how leadership relates to change and how it must differentiate itself from management. Viewers will be provided with important techniques and tips for leading change, regardless of one's position within his or her agency or organization.

This satellite training is available at no charge and only to the employees, directors, and Earth Team volunteers of the sponsors. Taping rights are available for the first seminar, "Leaders Teaching Leaders: Accelerating the Pipeline." It is important to note that "Leading Change" is for live broadcast only. Because taping rights are not available, "Leading Change" will not be available from the Social Sciences Institute's (SSI) lending library.

"The Leader in You" series is appropriate for staff development initiatives at all levels of The Conservation Partnership. SSI and the National Employee Development Center, in cooperation with the National Association of Conservation Districts, National Association of Conservation District Employees, and the National Association of State Conservation Agencies sponsor it.

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## **● MEETINGS/PRESENTATIONS**

### **#9 National Economist Meeting Scheduled for October**

The NRCS will hold a National Economist Meeting in Reno, Nevada, October 21-25, 2002, to enable NRCS economists at the State, Regional, and National levels to coordinate important policy directions and economic tools that can be shared among States. The conference will provide the opportunity to discuss the needs of the discipline, to exchange important technical tools and methods, and to learn key procedures and techniques necessary to successfully perform responsibilities under the new Farm Bill.

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## **#10 NRCS Soil Scientists Present at World Congress in Thailand**

Approximately 2000 soil scientists from around the world convene every 4 years for a scientific exchange. The following NRCS employees presented (or co-authored) oral and poster presentations at the 17th World Congress of Soil Science in Bangkok, Thailand: (1) Hari Eswaran (World Soil Resources, Soil Survey Division, NHQ), (a) Land use and land cover in Lithuania: an assessment of sustainable land use, (b) Classifying soils at the ultimate stage of weathering: a continuing challenge, (c) The 2002 soil regions map of Thailand, and (d) A preliminary assessment of the human impact on land systems of the world; (2) Carolyn Olsen (National Soil Survey Center, Nebraska), Welded Cenozoic soil sequences, West Texas, U.S.A.; (3) Robert Ahrens (National Soil Survey Center, Nebraska), Anthropogenic soils in the U.S.: conclusions from an international workshop; (4) Sheryl H. Kunickis (Soil Survey Division, NHQ), SoLIM: An approach to soil survey using GIS, artificial intelligence, and fuzzy logic; (5) Cathy Seybold (National Soil Survey Center, Nebraska), On-farm early indicators of cover crop effects on soil quality; (6) John Kimble (National Soil Survey Center, Nebraska), (a) Northern circumpolar soil database and derived soil maps in different classification systems, (b) Spectroscopic calibrations for the determination of carbon in soils, and (c) Morphogenesis of cryosols and associated soils in the alpine zone of Tianshan, West China; (7) Deborah Anderson (North Carolina), Soil survey activities and correlations by major resource land areas; (8) Lawrence McGhee (Alabama), Update two soil surveys on two military installations in Alabama (poster); and (9) Suzann Kienast (Utah), Landscape analysis for validating map unit concepts, Grand Staircase-Escalante National Monument.

The next meeting, in Philadelphia, Pennsylvania, in 2006, will be hosted by soil scientists in the United States.

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